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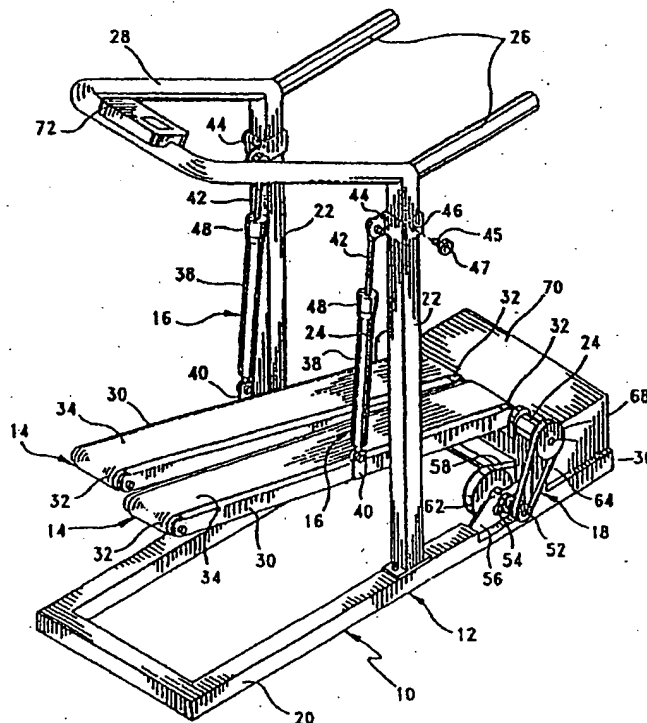
## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(21) International Application Number: PCT/US94/14694 (22) International Filing Date: 13 December 1994 (13.12.94) (30) Priority Data: 168,025 15 December 1993 (15.12.93) US (71)(72) Applicants and Inventors: PIAGET, Gary, D. [US/US]; 3390 American Saddler Drive, Park City, UT 84060 (US). GORDON, Trace, O. [US/US]; 3880 W. Lariat Road, Park City, UT 84060 (US). (74) Agents: SALTER, Elliot, A. et al.; Salter & Michaelson, 321 South Main Street, Providence, RI 02903 (US).	(81) Designated States: AM, AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, JP, KE, KG, KP, KR, KZ, LK, LR, LT, LU, LV, MD, MG, MN, MW, NL, NO, NZ, PL, PT, RO, RU, SD, SE, SI, SK, TJ, TT, UA, US, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG), ARIPO patent (KE, MW, SD, SZ). Published With international search report.	

(54) Title: TREADMILL WITH DUAL RECIPROCATING TREADS

## (57) Abstract

A treadmill device includes a frame (12) and two side by side treadmills (14) each having a continuous tread (34) and first and second ends. The first ends of the two treadmills are pivotally supported on a base portion of the frame by a roller shaft (32) which extends through the treadmill rollers. The second ends of the treadmills are independently supported by spring return hydraulic cylinders (38) which are connected between the treadmills and spaced support members of the frame. The continuous treads are driven by a motor (18) which is coupled to the roller shaft. The treadmills alternately pivot up and down as a user walks thereon.



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## 1           TREADMILL WITH DUAL RECIPROCATING TREADS

## 2       Background and Summary of the Invention:

3           The instant invention relates to exercise apparatus  
4       and more particularly to a treadmill having two side-by-  
5       side treads which reciprocate up and down during use  
6       thereby providing the benefits of both walking and stair  
7       climbing.

8           Treadmill-type walking apparatus and stair climbing  
9       apparatus have heretofore been known in the art. In this  
10      connection, the U.S. Patents to Speer, Sr. No. 4,204,673;  
11      Lee et al No. 4,938,473; and Trulaske No. 5,114,388  
12      represent the closest prior art to the subject invention  
13      of which the applicant is aware. The patent to Speer Sr.  
14      discloses a treadmill having dual treads which are  
15      independently operated to provide a separate control of  
16      speed and/or resistance for each leg. The tread  
17      platforms are stationary and do not move relative to each  
18      other. The patent to Lee et al concerns a treadmill  
19      having a trampoline-like surface. The Lee treadmill  
20      includes a continuous tread which is supported at the  
21      peripheral edges by a plurality of springs. The spring-  
22      supported tread is resilient enough to absorb shock and  
23      rigid enough to provide a stable exercising surface.  
24      There are no rigid supporting surfaces beneath the tread.  
25      The Patent to Trulaske discloses a stair exerciser  
26      including pivotable stair platforms. The stair platforms

1 reciprocate up and down as the user alternately steps up  
2 with each foot.

3       The instant invention provides a treadmill apparatus  
4 having dual treads which pivot up and down. Briefly, the  
5 treadmill comprises a frame, and two side-by-side  
6 treadmills each having a continuous tread and first and  
7 second ends. The first ends of the two treadmills are  
8 pivotably supported on a base of the frame by a roller  
9 shaft which extends through the treadmill rollers. The  
10 second ends of the treadmills are independently supported  
11 by spring-return hydraulic cylinders which are connected  
12 between the treadmills and spaced support members of the  
13 frame. The continuous treads are driven by a motor which  
14 is coupled to the roller shaft. The two treadmills  
15 alternately pivot up and down about the axis of the  
16 roller shaft as a user treads thereon. In this manner,  
17 the instant treadmill apparatus is operative for  
18 providing the aerobic benefits of both walking and stair  
19 climbing.

20       Accordingly, it is an object of the instant  
21 invention to provide an exercise device which offers the  
22 benefits of both walking and stair climbing.

23       It is another object to provide a treadmill having  
24 dual treads.

25       It is still another object to provide a treadmill  
26 having dual reciprocating treads.

1        It is yet another object to provide a treadmill  
2        having two side-by-side treads which are pivotably  
3        mounted to a frame at one end thereof.

4        Other objects, features and advantages of the  
5        invention shall become apparent as the description  
6        thereof proceeds when considered in connection with the  
7        accompanying illustrative drawings.

8

9        **Description of the Drawings:**

10       In the drawings which illustrate the best mode  
11       presently contemplated for carrying out the present  
12       invention:

13       Fig. 1 is a perspective view of the instant  
14       treadmill apparatus;

15       Fig. 2 is a fragmentary side view of one of the  
16       spring-return hydraulic cylinders; and

17       Fig. 3 is a fragmentary side view of the drive  
18       mechanism for the treads.

19

20       **Description of the Preferred Embodiment:**

21       Referring now to the drawings, the treadmill of the  
22       instant invention is illustrated and generally indicated  
23       at 10 in Fig. 1. As will hereinafter be more fully  
24       described, the instant treadmill apparatus 10 includes  
25       dual reciprocating treads which effectively provide the  
26       benefits of both walking and stair climbing

1 simultaneously. The treadmill apparatus 10 comprises a  
2 frame generally indicated at 12, first and second side-  
3 by-side treadmills generally indicated at 14, first and  
4 second spring-return hydraulic cylinders generally  
5 indicated at 16, and a drive mechanism generally  
6 indicated at 18.

7 The frame 12 is preferably constructed from tubular  
8 steel, and it preferably comprises a rectangular base 20  
9 and two spaced support members 22 which extend upwardly  
10 from a central portion of the base 20. The base 20  
11 includes two spaced upright arms 24 which are positioned  
12 adjacent one end thereof. The support members 22 each  
13 include a handlebar 26 which extends rearwardly from the  
14 support member 22, and the support members 22 still  
15 further include a U-shaped handle bar 28 which extends  
16 forwardly therefrom.

17 The two treadmills 14 are identical in construction,  
18 and they each preferably comprise a rigid treadmill  
19 platform 30, rollers 32 rotatably mounted at each of the  
20 first and second ends of the platform 30, and a  
21 continuous tread 34 which extends around the platform 30  
22 and is rotatably supported by the rollers 32. The  
23 construction of the treadmills 14 is considered to be  
24 conventional in the art, and therefore no further  
25 description is thought to be necessary. The treadmills  
26 14 are pivotably mounted to the frame 12 in side-by-side

1 adjacent relation by an elongated roller shaft 36 which  
2 extends through the rollers 32 at the first ends of the  
3 treadmills 14, and through the upright arms 24 on the  
4 base 20. More specifically, the roller shaft 36 is  
5 rotatably received through bearings (not shown) mounted  
6 in the upright arms 24. In this regard, it can be seen  
7 that the treadmills 14 pivot upwardly and downwardly  
8 about the axis of the roller shaft 36. It is pointed out  
9 that the roller shaft 36 is keyed to the rollers 32 for  
10 corresponding rotation thereof. The second ends of the  
11 treadmills 14 are supported in an inclined position by  
12 the spring-return hydraulic cylinders 16. The spring-  
13 return hydraulic cylinders 16 are conventional in the  
14 art, and they preferably each comprise a body 38 which is  
15 connected to a flange 40 on the outer side of the  
16 treadmill platform 30, a rod 42 which is connected to a  
17 tubular flange 44 on the spaced support member 22, and a  
18 coiled return spring (not shown) which is mounted inside  
19 the body 38. The flanges 44 are moveable up and down the  
20 length of the support members 22 for adjusting the angle  
21 of inclination of the treadmills. In this connection,  
22 the flanges 44 further include a set screw 45 which  
23 extends through a threaded aperture 46 in the flange 44  
24 and engages with the support member 22 for setting a  
25 position of the treadmill 14. The set screw 45 includes  
26 an enlarged knob 47 to facilitate rotation of the set

1 screw 45. Alternatively, the flanges 44 can be  
2 adjustable by means of a series of holes in the support  
3 members 22 and a set pin which extends through the  
4 flange 44 and one of the holes. The hydraulic  
5 cylinder 16 provides resistance against extension of the  
6 rod 42, and the return spring operates to return the rod  
7 42 to its original position after extension. In this  
8 connection, the coil spring supports the treadmill 14 in  
9 a first normal inclined position (solid lines in Fig. 2)  
10 while the hydraulic cylinder 16 resists downward pivoting  
11 movement of the treadmill 14 from the first position to  
12 a second position (broken lines in Fig. 2) when a user  
13 places his weight thereon. The coil spring then returns  
14 the treadmill 14 from the second position back to the  
15 first position when the user removes his weight from the  
16 treadmill 14. The hydraulic cylinders 16 each include a  
17 rotatable adjustment cap 48 which is operative for  
18 adjusting the resistance of the hydraulic cylinder 16.

19 It is contemplated that the spring-return hydraulic  
20 cylinders 16 can be replaced by a torsion spring which is  
21 received around the roller shaft 36. The torsion spring  
22 would be adjustable to provide variable resistance to  
23 downward movement of the treadmills 14. It is further  
24 contemplated that the internal return springs of the  
25 hydraulic cylinders 16 could alternatively comprise  
26 external rubber bands which extend between the



1     treadmills 14 and the support members 22. In this  
2     connection, the device would include a conventional  
3     hydraulic cylinders to resist downward movement of the  
4     treadmills 14 and rubber bands to return the  
5     treadmills 14 to their original position. It is pointed  
6     out that each of the spring return mechanisms must be  
7     strong enough to return the treadmills 14 to their  
8     original position before the user again steps thereon,  
9     yet they should not be so strong as to immediately snap  
10    the treadmills 14 back into position. In this  
11    connection, the hydraulic cylinders 16 provide some  
12    resistance during the return of the treadmills 14 so that  
13    the upward and downward pivoting of the treadmills occurs  
14    in a smooth transition.

15         The drive mechanism 18 comprises an electric motor  
16    48 (Fig. 3) which is mounted to the base 20 of the frame  
17    12. The motor 49 includes a rotatable drive shaft 50  
18    which is coupled to the roller shaft 36 by means of a  
19    belt and pulley transmission. The belt and pulley  
20    transmission includes a transmission shaft 52 which is  
21    rotatably captured in a bearing 54 which is mounted to a  
22    flange 56 on the base 20 of the frame 12. The drive  
23    shaft 50 is coupled to the transmission shaft 52 by a  
24    first belt 58 which extends around a pulley 60 on the  
25    drive shaft 50 and a pulley 62 on a first end of the  
26    transmission shaft 52. The transmission shaft 52 is

1 coupled to the roller shaft 36 by a second belt 64 which  
2 extends around a pulley 66 on the second end of the  
3 transmission shaft 52 and a pulley 68 on an exposed end  
4 of the roller shaft 36. In operation, rotation of the  
5 drive shaft 50 causes rotation of the transmission shaft  
6 52 which in turn causes rotation of the roller shaft 36,  
7 the rollers 32 and the continuous treads 34. Since both  
8 treadmills 14 are driven by a common roller shaft 36, the  
9 continuous treads 34 are driven at the same speed.

10 The base 20 of the frame 12 preferably includes  
11 rigid housing 70 which encloses the electric motor 48 and  
12 which also functions as a step or platform from which a  
13 user can step onto and off of the treadmills 14.

14 In operation, a user stands with one leg positioned  
15 on each of the side-by-side treadmills 14, and then walks  
16 on the treadmills 14 at a pace equal to the speed of the  
17 continuous treads 34, i.e. in the same manner as a  
18 conventional treadmill. As the user alternates his steps  
19 and transfers his weight back and forth between the two  
20 treadmills 14, the treadmills 14 alternately pivot up and  
21 down against the resistance of the hydraulic cylinders  
22 16. More specifically, when the user steps forward with  
23 one foot onto the inclined end of the respective  
24 treadmill 14, the treadmill 14 pivots downwardly about  
25 the axis of the roller shaft 36 against the resistance of  
26 the respective hydraulic cylinder 16. Thereafter, the

1 rotating tread 34 moves the user's foot rearwardly toward  
2 the first end of the treadmill 14 until the user steps  
3 forward with the opposite foot onto the inclined end of  
4 the opposite treadmill 14 wherein the second treadmill 14  
5 pivots downwardly and the first treadmill 14 is returned  
6 upwardly to its original position by the return spring.  
7 Accordingly, it can be seen that as a user treads upon  
8 the treadmills 14, they alternately reciprocate up and  
9 down in a manner similar to a stair climbing device.

10

11 The treadmill apparatus 10 is further provided with  
12 an electronic control and monitoring device 72 which is  
13 operative for controlling motor speed, and for measuring  
14 and displaying time, horizontal distance travelled,  
15 vertical distance travelled, calories burned, heart rate,  
16 and other exercise variables. It is contemplated that  
17 the electronic control device 72 can include a graphical  
18 display which graphically charts the average inclination  
19 being travelled by the user by extrapolating the  
20 horizontal and vertical distances travelled. The control  
21 device 72 is preferably mounted on the U-shaped handle  
22 bar 28 so that it is readily accessible to the user  
23 during operation of the treadmill 10.

24 While the preferred embodiment of the treadmill  
25 device 10 includes a motor 48 for driving the treads 34,  
26 the device 10 may also comprise an unmotorized embodiment

1 in which the inclined treadmills 14 are driven by gravity  
2 and the weight of the user as the user's feet  
3 alternatively step onto the treadmill 14

4 It can therefore be seen that the instant invention  
5 provides an exercise device 10 which is effective for  
6 simultaneously providing the exercise benefits of both a  
7 conventional treadmill and a stair climbing apparatus.  
8 The treadmill apparatus 10 includes dual side-by-side  
9 treadmills 14 which operate in a conventional manner to  
10 simulate walking. In addition, the dual treadmills 14  
11 pivot up and down as a user treads thereon to  
12 simultaneously simulate climbing stairs. The exercise  
13 device 10 is simple in design, and construction, and it  
14 is inexpensive to manufacture. For these reasons, the  
15 instant invention is believed to represent a significant  
16 advancement in the art which has substantial commercial  
17 merit.

18 While there is shown and described herein certain  
19 specific structure embodying the invention, it will be  
20 manifest to those skilled in the art that various  
21 modifications and rearrangements of the parts may be made  
22 without departing from the spirit and scope of the  
23 underlying inventive concept and that the same is not  
24 limited to the particular forms herein shown and  
25 described except insofar as indicated by the scope of the  
26 appended claims.

## Claims:

1        1. Treadmill apparatus comprising:  
2            first and second adjacent treadmills each having a  
3            continuous tread, and first and second ends;  
4            a frame pivotably supporting the first ends of said  
5            first and second treadmills;  
6            first and second spring means for supporting the  
7            respective second ends of said first and second  
8            treadmills in a first position above a supporting  
9            surface; and  
10           first and second resistance means for resisting  
11           downward pivoting movement of said first and second  
12           treadmills from said first position to a second position  
13           as a user's weight is placed upon said treadmills, said  
14           first and second spring means returning said first and  
15           second treadmills from said second position to said first  
16           position when said user's weight is removed from said  
17           first and second treadmills, said first and second  
18           treadmills alternately pivoting up and down about said  
19           first ends as a user treads thereon.

1        2. The treadmill apparatus of claim 1 further  
2        comprising        means for driving said continuous treads.

1        3. In the treadmill apparatus of claim 2, said first  
2        and second treadmills having rollers at said first and  
3        second ends for rotatably supporting said continuous  
4        treads, said first ends of said first and second  
5        treadmills being pivotably supported on said frame about  
6        an axis of said rollers.

1        4. The treadmill apparatus of claim 3 further  
2        comprising an elongated roller shaft which passes through  
3        said rollers at said first ends of said first and second  
4        treadmills, said roller shaft being rotatably supported  
5        on said frame means.

1        5. In the treadmill apparatus of claim 4, said drive  
2        means comprising a motor having a rotatable drive shaft  
3        and transmission means for transmitting rotation of said  
4        motor drive shaft to said roller shaft for rotation of  
5        said rollers and said continuous treads.

1        6. In the treadmill apparatus of claim 1, said first  
2        and second resistance means comprising first and second  
3        hydraulic cylinders which are connected between said  
4        frame and said first and second treadmills.

1        7. In the treadmill apparatus of claim 1, said first  
2        and second treadmills having rigid treadmill platforms.

3 for supporting said continuous treads thereon, said first  
4 and second resistance means comprising first and second  
5 hydraulic cylinders which are connected between said  
6 frame and said treadmill platforms.

1 8. In the treadmill apparatus of claim 6, said frame  
2 including a base and two spaced support members which  
3 extend upwardly from said base, said first and second  
4 hydraulic cylinders being connected between said spaced  
5 support members and said treadmill platforms.

1 9. In the treadmill apparatus of claim 1, said first  
2 and second spring means and said first and second  
3 resistance means comprising first and second spring  
4 return hydraulic cylinders which are connected between  
5 said frame means and said first and second treadmills.

1 10. The treadmill apparatus of claim 5 further  
2 comprising control means for controlling operation of  
3 said motor.

1 11. The treadmill apparatus of claim 1 further  
2 comprising electronic monitoring means for monitoring  
3 time, horizontal distance travelled and vertical distance  
4 travelled.

1        12. In the treadmill apparatus of claim 11, said  
2        monitoring means including a graphical display for  
3        graphically charting an average inclination being  
4        travelled by a user.

1        13. In the treadmill apparatus of claim 8, said first  
2        and second hydraulic cylinders each having a first end  
3        which is connected to a first flange on said treadmill  
4        platforms and a second end which is connected to a second  
5        flange on said spaced support members, said second flange  
6        being adjustably moveable on said support member for  
7        adjusting an inclination of said treadmill.



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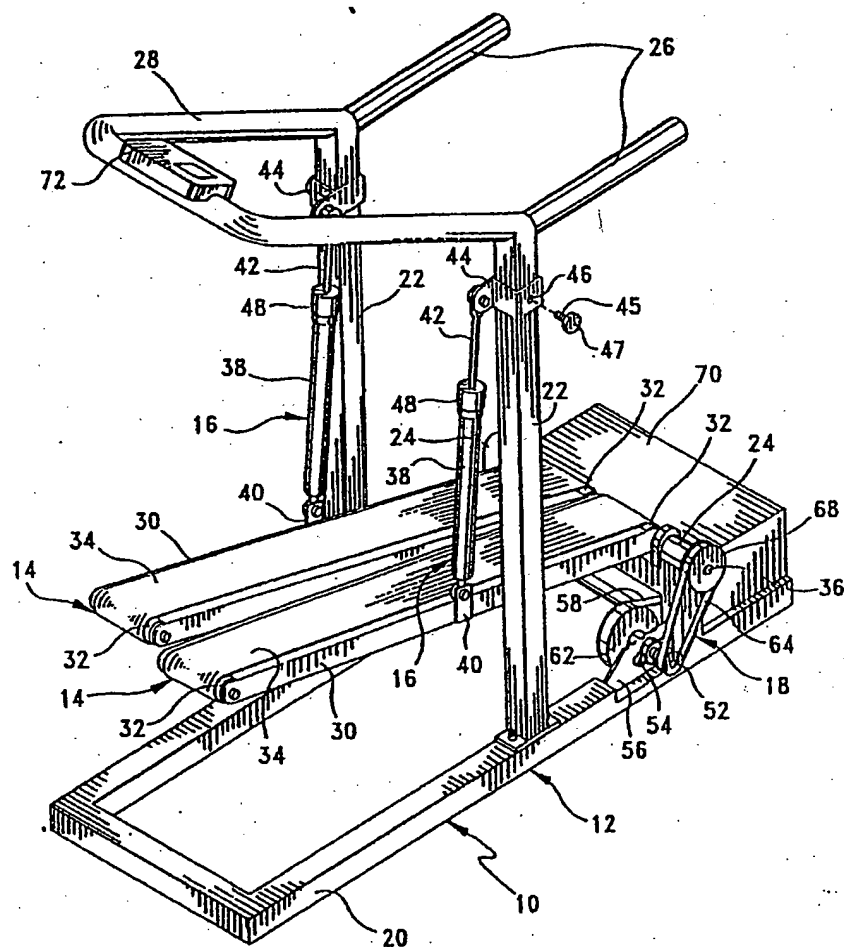


FIG. 1

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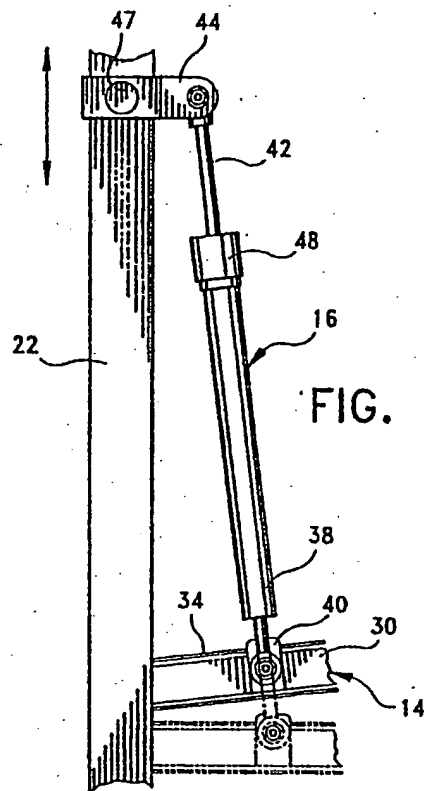


FIG. 2

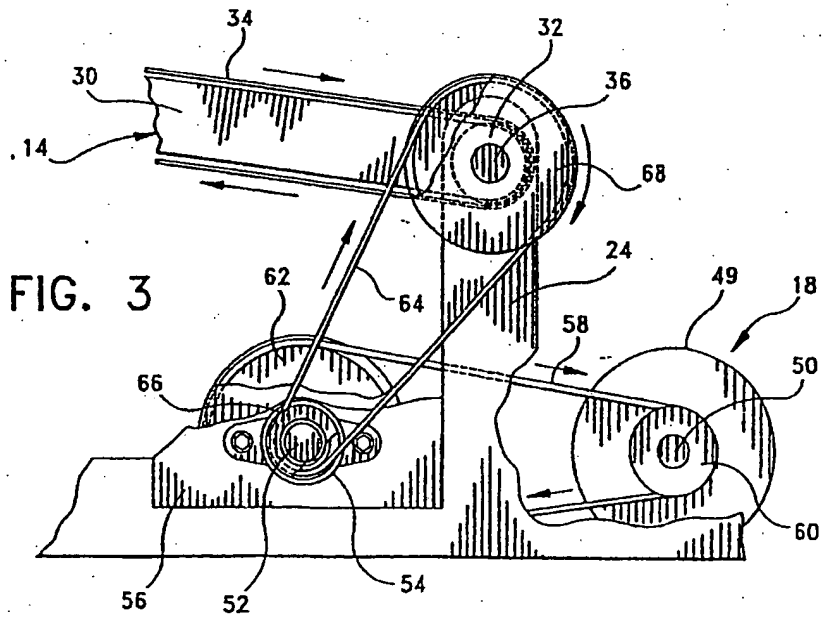


FIG. 3

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US94/14694

## A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :A63B 22/00, 22/04

US CL :482/51, 52, 54

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 482/51-54

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched  
NONE

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)  
NONE

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US, A, 5,160,302, (LI), 03 November 1992. See the entire document.	1-13
A	US, A, 4,204,673, (SPEER, SR.), 27 May 1980. See the entire document.	1-13
A	US, A, 4,938,473, (LEE ET AL.), 03 July 1990. See the entire document.	1-13

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

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